# ARE LARGE CORE RADIUS CLUSTERS MERGING SYSTEMS?

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We have analyzed the ROSAT data for A1367, A194 and the Coma cluster. Spectra have been fit to A1367 and we are comparing the results to ASCA observations. For A1367 there appears to be a temperature difference between the two components of the cluster. Surprisingly, the north-western component which is less X-ray luminous is *hotter* than the south-eastern component which is more X-ray luminous. We interpret this anti-correlation as arising from shock heating of the less luminous component as it is falling into the main body of the cluster. Similar effects are seen in numerical simulations of cluster dynamics.

A second area of investigation has been the application of a new analysis tool, wavelet transforms to clusters of galaxies. This is particularly useful for the study of large core radius clusters to study their underlying structure. One paper discussing this has been published. In this paper, we have developed a new technique based on a wavelet transform analysis to quantify the small-scale (less than a few arcminutes) X-ray structure of clusters of galaxies. We applied this technique to the ROSAT position sensitive proportional counter (PSPC) and Einstein high-resolution imager (HRI) images of the central region of the cluster Abell 1367 to detect sources embedded within the diffuse intracluster medium. In addition to detecting sources and determining their fluxes and positions, we showed that the wavelet analysis allows a characterization of the sources extents. In particular, the wavelet scale at which a given source achieves a maximum signal-to-noise ratio in the wavelet images provides an estimate of the angular extent of the source. To account for the widely varying point response of the ROSAT PSPC as a function of off-axis angle requires a quantitative measurement of the source size and a comparison to a calibration derived from the analysis of a Deep Survey image. Therefore, we assume that each source could be described as an isotropic two-dimensional Gaussian and used the wavelet amplitudes, at different scales, to determine the equivalent Gaussian Full Width Half-Maximum (FWHM) (and its uncertainty) appropriate for each source. In our analysis of the ROSAT PSPC image, we detected 31 X-ray sources above the diffuse cluster emission (within a radius of 24 min), 16 of which are apparently associated with cluster galaxies and two with serendipitous, background quasars. We found that the angular extents of 11 sources exceed the nominal width of the PSPC point-spread function. Four of these extended sources were previously detected by Bechtold et al. (1983) as 1 arcsec scale features using the Einstein HRI. The same wavelet analysis technique was applied to the Einstein HRI image. We detected 28 sources in the HRI image, of which nine are extended. Eight of the extended sources corresponded to sources previously detected by Bechtold et al. Overall, using both the PSPC and the HRI observations, we detected 16 extended features, of which nine have galaxies coincident with the X-ray-measured positions. These extended sources have luminosities lying in the range $(3 - 30) \times 10^{40}$ ergs/s and gas masses of approximately $(1 - 30) \times 10^9$ solar mass, if the X-rays are of thermal origin. We confirmed the presence of extended features in A1367 first reported by Bechtold et al. (1983). The nature of these systems remains uncertain. The luminosities are large if the emission is attributed to single galaxies, and several of the extended features have no associated galaxy counterparts. The extended features may be associated with galaxy groups which have not yet fully been disrupted and merged into the cluster.

For A194, we have fit spectra to the diffuse emission as well as to that for the individual galaxies in the cluster. For A194, we detect six individual galaxies and have fit spectra

to the brighter ones. We have computed hardness ratio maps, iron abundance maps, and wavelet transform images to select different scale structures. Attached are examples of the A194 maps. Note that a region of higher abundance appears to the west and that this is also confirmed in the ASCA data.

For the Coma cluster, we have detected a new feature in the merged ROSAT data. On small scales, $\leq 1'$, the wavelet analysis shows substructure dominated by two extended sources surrounding the two brightest cluster galaxies NGC 4874 and NGC 4889. On slightly larger scales, $\sim 2' - 3'$, the wavelet analysis reveals a filament of X-ray emission originating near the cluster center, curving to the south and east for $\sim 25'$, and ending near the galaxy NGC 4911. These results extend earlier ROSAT observations and further indicate the complex nature of the cluster core. We are exploring the implications of these results and preparing a paper.